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Progress in the Prevention and Control of Air Pollution in 1982

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PROGRESS IN THE PREVENTION AND CONTROL OF AIR POLLUTION IN 1982

ANNUAL REPORT OF THE ADMINISTRATOR
OF THE ENVIRONMENTAL PROTECTION AGENCY
TO THE
CONGRESS OF THE UNITED STATES
IN COMPLIANCE WITH
SECTIONS 313, 202(b)(4), and 306
OF
42 U.S.C. 7401 ET SEQ.
THE CLEAN AIR ACT, AS AMENDED

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16. ABSTRACT

The report addresses the progress made in the prevention and control of air pollution in 1982. It covers the areas of air quality trends and monitoring, development of air quality criteria and standards, the status of State Implementation Plans, the control of stationary and mobile source emissions, enforcement, and litigation. The report is the annual report of the Administrator of EPA to the Congress in compliance with Sections 313, 202(b)(4), and 306 of the Clean Air Act, as amended.

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PREFACE

The Clean Air Act, as amended, authorizes a national program of air pollution research, regulation, and enforcement activities. This program is directed at the Federal level by the U.S. Environmental Protection Agency (EPA). However, primary responsibility for the prevention and control of air pollution at its source continues to rest with State and local governments. EPA's role is to conduct research and development programs, set national standards and regulations, provide technical and financial assistance to the States, and, where necessary, supplement State implementation programs.

Section 313 of the Clean Air Act requires the Administrator to report on measures taken toward implementing the purpose and intent of the Act. This report covers the period January 1 to December 31, 1982, and describes the issues involved in the prevention and control of air pollution and the major elements of progress toward that goal that have been made during that time. In addition, this report also includes two other EPA reports to Congress required under the Clean Air Act, as amended:

1. Section 306 report on Federal procurement and violating facilities (Chapter VII), and

2. Section 202(b)(4) report on measures taken in relation to motor vehicle emissions control (Chapter VIII).

I. INTRODUCTION AND SUMMARY

A. OVERVIEW

This report describes the progress that the Environmental Protection Agency (EPA) has made in the prevention and control of air pollution during 1982. In many cases, this progress builds on the experiences of the prior decade. The following paragraphs summarize the contents of the remaining chapters of this report, especially insofar as those chapters illuminate current understanding of air quality problems, controls, and administrative apparatus. Since it takes approximately one year to assemble, analyze, and report air quality and emissions data, the latest data available for this report is for the year 1981.

B. AIR QUALITY TRENDS, MONITORING, AND MODELING

With the exception of nitrogen dioxide, data trends over the last several years show continuing improvements across the country in ambient air quality and total pollutant emissions. For example:

- Between 1980 and 1981, average ambient total suspended particulate (TSP) levels decreased 6 percent while TSP emissions from man-made sources decreased approximately 2 percent.

- Average ambient levels of sulfur dioxide (SO_2) decreased 27 percent between 1975 and 1981 and total SO_2 emissions decreased 12 percent.

- Average ambient carbon monoxide (CO) levels decreased 26 percent between 1975 and 1981, and the annual rate of improvement has been approximately 5 percent. Total CO emitted during this time decreased 10 percent.

- Average ambient nitrogen dioxide (NO_2) levels increased 5 percent between 1975 and 1981, but the levels were declining between 1980 and 1981.

- Between 1975 and 1981, average ambient ozone (O_3) levels decreased 14 percent. Total emissions of volatile organic compounds (VOC's), which are ozone precursors, declined approximately 9 percent during this same period.

- The composite maximum quarterly average of ambient lead levels decreased 57 percent between 1975 and 1981. This is consistent with a reduction in lead consumption in gasoline of 67 percent in this period.

EPA promulgated regulations in 1979 which required States to establish and operate air monitoring networks and to report the data to EPA. Two types of permanent stations are provided for in the regulations: State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring

Stations (NAMS). The SLAMS, which were designed to meet the overall monitoring requirements of State Implementation Plan activities, were required to meet all provisions of the regulations by January 1, 1983. Through December 1982, there were 4,659 SLAMS monitors out of a total planned network of 4,959 monitors that met all requirements of the regulations. The NAMS, which are a subset of the SLAMS network, are designed to provide a national monitoring network as required by Section 319 of the Act. Through December 1982, there were 1,323 NAMS monitors out of a total planned network of 1,370 monitors that met all requirements of the regulations.

In 1981, EPA entered into a cooperative agreement with the American Meteorological Society for peer scientific review of EPA's modeling guidance. During 1982, this program to evaluate several categories of models was continued. The evaluation of rural models was completed and the results reaffirmed that these models are reasonably reliable in estimating the magnitude of the highest concentrations occurring at some time and at some place within a geographic area. The evaluation of urban models was initiated and will be completed in 1983. Data bases for complex terrain and long-range transport models were compiled in 1982 and evaluation will be initiated in 1983.

C. AIR POLLUTION RESEARCH PROGRAMS

EPA's air pollution research program is divided into four major categories: Oxidants, Mobile Sources, Gases and Particles, and Hazardous Air Pollutants. The research in each of these areas is planned by a Research Committee composed of EPA research managers and representatives from EPA's program offices. Each Research Committee plans the full range of research for the pollutants covered by that Committee. The research covers scientific assessments, monitoring systems and quality assurance, health effects, environmental engineering and technology, and environmental processes and effects.

In the oxidants area, major efforts included research directed toward assessing pulmonary function changes in healthy and potentially sensitive populations following oxidant inhalation and research aimed at developing better models to extrapolate animal effects data to humans. Research in the mobile sources area in 1982 emphasized the health effects of diesel exhaust and carbon monoxide emissions. Research was also directed toward characterizing the gaseous and particle emissions from a variety of motor vehicle categories. Research in the gases and particles area in 1982 included the successful testing and installation of 10-micrometer samplers for particulate matter at 24 stations, assessment of the use of adipic acid to enhance limestone flue gas desulfurization systems, and research into the transport and fate of sulfur dioxide and particles as well as their effects on agricultural crops, materials, and visibility. Research on hazardous air pollutants included the preparation of health assessments on a number of chemicals, the development of methods to identify mutagenic compounds in the ambient air, quantification of the levels of potentially hazardous air pollutants,and the determination of their fate in the atmosphere.

In addition, EPA conducted research on the sources, effects, and possible mitigation strategies for controlling acid deposition. During 1982, EPA worked to establish more clearly and verify the relationship between emissions and deposition, determine the dose-response functions and the extent of potential impacts, and assess the relative costs and benefits of possible mitigation strategies.

D. DEVELOPMENT OF NATIONAL AMBIENT AIR QUALITY STANDARDS

The 1977 Clean Air Act Amendments require EPA to review and, if necessary, revise the national ambient air quality standards (NAAQS) on a five-year basis. Reviews of all seven NAAQS were in progress in 1982 including the anticipated revocation of the hydrocarbon (HC) NAAQS on the basis that the HC NAAQS was no longer an appropriate guide for attaining the ozone NAAQS and that more sophisticated techniques are now available for designing ozone control strategies.

EPA continued to review the NAAQS for nitrogen oxides, particulate matter, and sulfur oxides. Proposal of revised or reaffirmed standards for nitrogen oxides and particulate matter is expected in 1983 and for sulfur oxides in 1984. In addition, work on revising the criteria documents for lead and ozone continued in 1982.

E. STATUS OF AIR QUALITY MANAGEMENT PROGRAMS

In late 1982, EPA prepared a Federal Register notice for publication in early 1983 that identified portions of 32 States and Territories that EPA concluded would either not attain air quality standards as required or else would not comply with certain other portions of the Act pertaining to nonattainment plans.

Also in late 1982, EPA prepared a Federal Register notice for publication in early 1983 that pertained to those States that requested an extension of the December 31, 1982, attainment date for ozone or carbon monoxide or both. States that received an extension were required to submit implementation plans that demonstrated attainment of the relevant standards no later than December 31, 1987. In the same Federal Register notice, EPA proposed disapproval of plans for 17 of the 31 States that were required to submit revised implementation plans.

Through 1982, EPA reviewed and took final action on 21 complete lead State Implementation Plans (SIP's) and 7 partial SIP's. In 1982, the Natural Resources Defense Council and others filed suit to require EPA to promulgate lead SIP's for those States that had not yet submitted them and to approve or disapprove lead SIP's that had been submitted but on which EPA had not taken final action.

One of EPA's most significant air quality management initiatives during the year was the reduction of the SIP backlog. In 1982, changes to the SIP review process were made to accelerate review of routine and noncontroversial SIP actions and reduce the duplication of effort between the States, the EPA Regional Offices, and EPA Headquarters. Prior to the implementation of these changes, the inventory of SIP submittals awaiting Regional Office and Headquarters action was growing because EPA was only able to process SIP actions at two-thirds the SIP submittal rate. A project was begun in late 1981 and continued into 1982 to substantially reduce this inventory. A reduction of 93 percent was achieved by July 1, 1982. The continuing objective is to process SIP revisions as rapidly as possible in order to avoid any future backlogs.

EPA is actively working to delegate more air quality management programs to State and local air pollution control agencies. At the same time, EPA is developing uniform audit processes to assure that national air quality goals are met while promoting and enhancing a cooperative working relationship between EPA and State and local agencies. In 1982, efforts in this area were directed toward developing comprehensive guidance for implementation of a nationally consistent air audit system.

Another major EPA activity in 1982 was the development and implementation of various controlled emissions trading concepts such as bubble trades and banking of emissions reductions. EPA proposed or approved a total of 33 bubble applications which would save users more than $120 million over the cost of conventional air pollution control devices. In addition, three metropolitan areas and one State developed and operated formal emissions banking systems. These activities did not alter air quality requirements but simply gave States and industry more flexibility in adopting control strategies to meet the requirements.

For several years, EPA has maintained clearinghouses of technical information. One clearinghouse contains information on best available control technology (BACT) and lowest achievable emission rates (LAER). This BACT/LAER clearinghouse is a central collection point for basic BACT/LAER information and is designed to assist State and local agencies in the technical aspects of BACT/LAER determinations. Participation in the clearinghouse by State and local agencies is voluntary. In 1982, EPA revitalized the clearinghouse to increase user participation and to increase the efficiency of information receipt and distribution. In addition, EPA published a report in May 1982 in which over 550 BACT/LAER determinations were summarized. Another clearinghouse contains information on air quality modeling. This clearinghouse maintains a historical record of modeling decisions, clarifies EPA modeling guidance and promotes an awareness of EPA modeling policies.

The Chemical Manufacturers Association (CMA) and others legally challenged the regulations that EPA promulgated on August 7, 1980, dealing with prevention of significant deterioration (PSD) and nonattainment area

new source review regulations. In attempting to resolve the CMA concerns and to explore certain regulatory reform measures, EPA entered into a litigation settlement with the industrial parties on February 22, 1982, in which EPA agreed to propose certain regulatory changes. One change concerning vessel emissions was promulgated June 25, 1982. Other proposals are scheduled for 1983.

F. CONTROL OF STATIONARY SOURCE EMISSIONS

In the area of stationary source controls, work progressed on the development of emissions standards for those major source categories not yet regulated under new source performance standards (NSPS). A total of nine NSPS were promulgated in 1982, and ten were proposed. Thirteen promulgations are planned for 1983.

Regulations under Section 112 of the Act governing coke oven emissions and benzene emissions from a number of sources in the chemical and petroleum industries were in preparation in 1982.

G. STATIONARY SOURCE COMPLIANCE

In the late 1970s, EPA embarked on a program to bring sources which had never installed control equipment into initial compliance with applicable air quality regulations. Through the combined efforts of industry, States, and the Federal government, the goals of this program had been largely achieved by the end of 1982, when over 94 percent of the sources in the country were reported as achieving initial compliance or being in compliance with schedules to install controls. Among the sources brought into compliance through this effort were some of the largest contributors to the nation's air pollution problems, with many of them having been in violation for several years.

On September 20, 1982, the Administrator issued a policy on enforcement against sources in primary nonattainment areas that are not in compliance with the Clean Air Act by December 31, 1982. The policy recognizes that courts have equitable jurisdiction to fashion relief that allows a source to continue to operate in violation beyond 1982 while taking steps to come into compliance expeditiously. The policy sets forth criteria to determine the relief the Agency should seek in each case, particularly whether a compliance schedule is appropriate or whether the Agency should seek closure of the source until it can demonstrate compliance.

One of the major emphases of the air enforcement program has been the implementation of the Steel Industry Compliance Extension Act. Under this Act, Congress gave the EPA Administrator authority to extend deadlines for installation of certain air pollution control equipment for up to three years if a company agreed to invest an amount at least equal to the deferred costs of pollution control equipment in modernization to improve the efficiency and productivity of its steel-making facilities.

A total of ten companies submitted applications since the legislation was signed on July 17, 1981. In 1982, consent decrees implementing the Administrator's favorable findings on four of these applications were negotiated with the eligible companies and were at various stages in the judicial process.

H. CONTROL OF MOBILE SOURCE EMISSIONS

In the area of light-duty vehicle emission standards, EPA has proposed to postpone from 1985 to 1987 the requirement that particulate emissions from passenger cars be limited to 0.2 grams per mile due to concerns about the reliability of control technology. In 1982, EPA prepared rulemaking pertaining to high altitude standards for 1984 light-duty vehicles and 1984 and later light-duty trucks, and proposed high altitude standards for 1985 and later light-duty vehicles. For heavy-duty vehicles, standards controlling heavy-duty evaporative hydrocarbon emissions for the first time were prepared for promulgation in early 1983. EPA also proposed that exhaust emission regulations for model year 1984 heavy-duty engines requiring the use of catalyst technology be revised to a level that would not require catalysts, due to the large costs involved and the financial state of the industry.

In 1982, EPA published a rule revising the standards applicable to the lead content of gasoline. This action will reduce airborne lead 34 percent more by 1990 than under the previous rule.

In order to assure that motor vehicles conform to applicable emissions standards, EPA required the recall of 1,169,352 vehicles in 1982. In addition, auto manufacturers voluntarily recalled 28,049 vehicles to correct emissions problems.

EPA is responsible for implementing programs designed to deter tampering with vehicle emissions control systems or using leaded fuel in vehicles which require unleaded fuel. In 1982, EPA prepared an initiative to promote State and local anti-tampering and anti-fuel switching enforcement programs.

I. LITIGATION

The U.S. Courts of Appeals decided ten cases under the Clean Air Act in 1982. Nine of the ten cases involved the rules for setting up, approving, and operating SIP's.

The most important case decided in 1982 was NRDC v. Gorsuch which dealt with the definition of a major source for new source review purposes. EPA regulations had allowed States to treat as a single source the situation where a number of emitting units, each of which could be a major source if viewed in isolation, are located at a common plant site. The District of Columbia Circuit Court rejected this approach.

Other major decisions in 1982 related to EPA's approval of State relaxations of control requirements for sulfur dioxide. Three decisions in 1982 upheld EPA's approval of such revisions.

Other decisions in 1982 upheld EPA's policies of conditionally approving SIP's and approving or disapproving portions of SIP's instead of the total plan.

II. AIR QUALITY TRENDS, MONITORING, AND MODELING

This chapter describes current trends in ambient air quality levels (the concentration of a given pollutant in the atmosphere) as well as trends in the actual emissions into the air of the various pollutants. In addition, the chapter discusses the topics of air quality monitoring and air quality modeling. Data on ambient air quality levels and emissions are through 1981, the latest year for which EPA has complete statistics.

A. NATIONAL AIR QUALITY AND EMISSION TRENDS

National ambient air pollution levels have dropped for each of the major pollutants between 1980 and 1981. This is the first time that a short-term improvement has been observed for each of the pollutants for which there are national ambient air quality standards. The ambient air quality data used in the following pollutant assessments were obtained from EPA's National Aerometric Data Bank. The data were gathered primarily from State and local air pollution control agencies through their monitoring activities.

All of the ambient air quality trend analyses, which follow, required the monitoring sites used to contain at least 5 of the 7 years of data in the period 1975 to 1981. In each of these years, an annual data completeness criterion had to be met. As a result of these criteria, only a subset of existing sites are used for trends purposes.

Total Suspended Particulate (TSP) - The trend in TSP is complicated by the fact that the glass fiber filters used to collect TSP data have been manufactured by different vendors. Since 1977, the glass fiber filters used throughout the nation at TSP monitoring sites have been centrally procured by EPA for the State and local agencies in order to obtain uniformity in TSP collection methods and save money. The filters used in 1979, 1980, and 1981 were found to record higher values than the filters used in 1978 and 1982 because of higher filter alkalinity, which is related to conversion of sulfur dioxide and nitrogen dioxide to particulate sulfates and nitrates. This complication makes it difficult to determine long-term changes in air quality for the period 1975 to 1981. However, the short-term changes in air quality between 1980 and 1981 can be examined for the filters used in both years were manufactured by the same vendor. The median rate of decrease among the 1289 sites with data in 1980 and 1981 was 6 percent. Most of the decrease between 1980 and 1981 occurred in the Northeastern, North Central, Rocky Mountain, and Northwestern States. The largest decrease in ambient TSP air quality levels was observed in the Northwestern States which fell 13 percent between 1980 and 1981. Particulate emissions exhibited a decrease of approximately 20 percent during the 1975 through 1981 time period with a decrease of approximately 2 percent between 1980 and 1981. It is not entirely clear why the estimated emissions decrease is 2 percent between 1980 and 1981, while the TSP air quality decrease is 6 percent.

Sulfur Dioxide (SO_2) - Annual average ambient SO_2 air quality levels measured at 416 sites with continuous SO_2 monitors decreased 27 percent from 1975 to 1981. A similar decrease of 31 percent was observed in the trend in the composite average of the second maximum 24-hour average. Correspondingly, there was a 12 percent drop in sulfur oxide emissions. Even though precise statistics on power plant siting trends are not available, the difference between emission trends and air quality trends is believed to arise because new electric utility power plants have been located in rural areas while older plants located in urban areas have been closed. Most of the ambient monitors are located in urban areas with few in rural areas. Further, the residential and commercial areas, where the monitors are located, have shown sulfur oxide emission decreases comparable to SO_2 air quality improvement. These decreases in sulfur oxide emissions in the residential and commercial areas are believed to be due to a combination of energy conservation measures and the use of cleaner fuels.

Carbon Monoxide (CO) - The second highest nonoverlapping 8-hour average ambient CO air quality levels at 224 sites decreased at a rate of approximately 5 percent per year, with an overall reduction of 26 percent between 1975 and 1981. An even greater improvement was observed in the estimated number of exceedances, which decreased 84 percent. The improvements generally reflect CO levels at traffic-saturated monitoring sites in the center city, which are believed to have experienced little or no change in the number of vehicles in their vicinity. A check of selected National Air Monitoring Stations shows no discernible change in traffic volume on the roads adjacent to the sites over the time period 1975-1981. Consequently, the improvement in CO air quality levels reflects the reduction in emissions from new cars resulting from Federal standards for vehicle emissions. CO emissions decreased 10 percent during the same period. Between 1980 and 1981, the median rate of improvement was 3 percent among the 163 sites with both 1980 and 1981 data. If only the sites with second maximum values above the level of the 8-hour CO standard are considered, the median rate of improvement was 7 percent, so that the higher sites continued to show improvement for the second maximum value between 1980 and 1981.

Nitrogen Dioxide (NO_2) - Annual average ambient NO_2 air quality levels measured at 445 sites increased from 1975 to 1979 and then began declining. The air quality trend is very similar to the trend in nitrogen oxides emissions. The net long-term change between 1975 and 1981 is an increase of 5 percent in NO_2 air quality levels and a 5 percent increase in emission levels. A decrease was observed between 1980 and 1981 in both the air quality, as measured at 201 sites with data in both years, and emissions levels of 8 and 2 percent, respectively.

Ozone (O_3) - The composite average of the ambient second highest daily maximum 1-hour O_3 air quality values recorded at 209 sites decreased 14 percent between 1975 and 1981. An even greater improvement was observed in the estimated number of exceedances in the third quarter ozone season, which decreased 42 percent. Volatile organic compound (VOC) emissions

decreased 9 percent during the same time period. The greater improvement observed in ozone air quality levels appears to be a combination of reductions in VOC emissions and the change in the calibration procedure which took place between 1978 and 1979. Between 1980 and 1981, the majority of the 159 trend sites with ambient air quality data in both years decreased with a median rate of improvement of 8 percent. This is consistent with the 7 percent drop in VOC emissions during this period.

Lead (Pb) - The composite maximum quarterly average of ambient lead air quality levels, recorded at 92 sites, decreased 57 percent between 1975 and 1981. The sample of 92 sites is heavily weighted by monitors in the States of Texas, Maryland, and Pennsylvania. Individual trends in each of these States show decreases. The lead consumed in gasoline dropped 67 percent, primarily because the use of unleaded gasoline is required in catalyst-equipped cars. Between 1980 and 1981, the maximum quarterly average lead air quality levels decreased 18 percent among the 113 sites with data in both years. The decrease in lead consumption over the same time period is 29 percent.

B. AMBIENT AIR MONITORING

EPA promulgated regulations in 1979 which required States to establish and operate ambient air monitoring networks and to report the data to EPA.1/ Two types of permanent stations are provided for in the regulations--State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring Stations (NAMS).

The SLAMS, which were designed to meet the overall monitoring requirements of State Implementation Plan activities, were required to meet all provisions of the regulations by January 1, 1983. The NAMS, a subset of the SLAMS, were to provide a national monitoring network as required by Section 319 of the Clean Air Act. The NAMS deadline for meeting all provisions of the monitoring regulations was January 1, 1981.

Tables II-1 and II-2 summarize the status of the SLAMS and NAMS network through December 1982. Table II-3 lists, by pollutant, the number of SLAMS as well as NAMS.

Table II-1 SLAMS Status Through December 1982

Network	Number of Monitors	Percent of Total Network
Total planned network*	4959	100.0
Less: Monitors not operational	127	2.6
Monitors operational	4832	97.4
Less: Monitors using uncertified or unacceptable equipment	0	0
Monitors not having a fully approved quality assurance plan	85	1.7
Monitors improperly located	88	1.7
Monitors in operation meeting all requirements of the regulations	4659	94.0

*Includes NAMS monitors

Table II-2 NAMS Status Through December 1982

	Number of Monitors	Percent of Network
Total planned network	1370	100.0
Less: Monitors not operational	16	1.2
Monitors operational	1354	98.8
Less: Monitors using uncertified or unacceptable equipment	0	0
Monitors not having a fully approved quality assurance plan	31	2.2
Monitors improperly located	0	0
Monitors in operation meeting all requirements of the regulations	1323	96.6

Table II-1 shows a total of 4959 planned SLAMS monitors of which 4832 or approximately 97 percent were in operation. This number is about the maximum expected since monitoring station shutdowns routinely occur because of lost leases, urban renewal projects, and changing ambient air monitoring priorities. The table also shows that 4659 or 94 percent of the total planned network are meeting all requirements of the regulations. The 173 noncomplying operating monitors should meet the requirements with some small changes in monitor locations and the submittal of approvable standard operating procedures for three local agencies.

Table II-2, shows that of the 1370 planned NAMS, 1354 or approximately 99 percent were in operation through December 1982. Of the operating monitors, 1323 were meeting all requirements of the regulations. The remaining monitors, which are mostly lead monitors, should be in compliance by April 1983. Lead monitors were required to meet all monitoring regulations by July 1, 1982.

Table II-3 National Summary of Air Monitoring Stations

Pollutant	SLAMS (including NAMS)	NAMS
TSP	2637	649
SO_2	603	231
NO_2	290	56
CO	454	113
O_3	616	214
Pb	359	107
TOTAL	4959	1370

C. AIR QUALITY MODELING

An air quality model is a set of mathematical equations that describe the atmospheric transport, dispersion, and transformation of pollutant emissions. By means of these equations, a model can be used to calculate or predict the air quality impacts of emissions from proposed new sources, emissions from existing sources, or changes in emissions from either of these source categories. These models are of great utility because they provide a means whereby the effectiveness of air pollution controls can be estimated before action is taken.

During 1982, the major program to evaluate several categories of models was continued. This program was developed in response to recommendations of the American Meteorological Society (AMS) under its cooperative agreement with EPA. The evaluation and scientific review of rural models was completed. The evaluation of urban models was initiated and will be completed in 1983. Data bases for complex terrain and long-range transport models were compiled and evaluations will be initiated in 1983.

The evaluation of rural models reaffirmed that models are reasonably reliable in estimating the magnitude of the highest concentrations occurring some time, somewhere within an area. For example, errors in highest estimated concentrations of ± 10 to 40 percent are found to be typical, i.e., certainly well within the often-quoted factor-of-two accuracy that has long been recognized for these models. However, estimates of concentrations that occur at a specific time and site are often poorly correlated with actually observed concentrations and are much less reliable. Poor correlations are probably due to uncertainties in our knowledge of the precise plume location for any given time period.

Work also continued on the explicit consideration of model uncertainty in decision-making. Under the AMS/EPA cooperative agreement, the AMS conducted a workshop on "Quantifying and Communicating Uncertainty in Regulatory Air Quality Modeling." A major result of the workshop was the proposal of a new technique to directly calculate uncertainty. This proposal is being studied and tested both in-house and under contract. In addition, efforts are being made to further test and expand the expected exceedances (ExEx) methodology, which allows variability in fuel quality to be considered. Inclusion of multi-year, variable meteorological conditions was successfully implemented to improve the representativeness of the method. During 1983, an effort will be made to integrate calculation of model uncertainty directly with the ExEx methodology. As a result, decision-makers could have a complete, quantitative assessment of the effects of variable emissions, meteorological conditions, and model performance on effective and reliable control regulations for fuel burning sources.

Efforts to improve guidance on air quality models and ensure consistency in their use have also continued. Model clearinghouse activities were maintained to ensure that use of nonguideline techniques does not lead to inconsistent regulatory decisions. A workshop was held with modeling contacts in EPA's ten Regional Offices to improve communications on the use of models and to resolve problems common to several Regions. Guidance on such problems was expanded and circulated to these offices. Finally, work to revise and update the "Guideline on Air Quality Models" was initiated.2/ During 1983, an effort will be made to incorporate the results of the model evaluation program, uncertainty analyses, and ongoing efforts to ensure consistency into improved modeling guidance for regulatory applications.

III. AIR POLLUTION RESEARCH PROGRAMS

EPA's Office of Research and Development (ORD) provided extensive technical support to EPA's air pollution control activities in 1982. ORD's air research program is divided into four major categories: Oxidants, Mobile Sources, Gases and Particles, and Hazardous Air Pollutants. The research in each of these areas is planned by a Research Committee composed of ORD managers and representatives from EPA's program offices. Each Research Committee plans the full range of research for the pollutants covered by that Committee. The research covers the areas of scientific assessments, monitoring systems and quality assurance, health effects, environmental engineering and technology, and environmental processes and effects. The discussion of 1982 research accomplishments is organized along these lines. In addition to the discussions of the four major air research programs, a discussion of ORD's research program on acid deposition is included.

A. OXIDANTS

The oxidants research program focuses on air pollution problems associated with ozone (O_3), nitrogen dioxide (NO_2), and volatile organic compounds (VOCs).

Scientific Assessments

National workshops were convened to collect data and discuss scientific issues necessary to update the criteria document for ozone and other photochemical oxidants. The final review draft of the document is scheduled to be completed in 1984 and published in 1985.

Monitoring

The first operational, standard ultraviolet spectrophotometer was delivered to EPA by the National Bureau of Standards. Additional units are to be used as standards for the calibration of field units. An interim report was published describing the atmospheric ozone concentration in National Forests (National Air Pollution Background Network). Work continued on the development of a cryogenic system for trapping and measuring non-methane hydrocarbons. A portable auditing system was developed and is in use for the calibration and auditing of existing field monitors of ozone and nitrogen oxides (National Audit Program). Final data reports were published for urban/point source plumes in the Midwestern U.S. and Northeastern U.S. A final report was prepared covering a monitoring project for the South Coast Air Basin/Southeast Desert Oxidant Transport Study and the operational phase of the San Diego Oxidant Transport Study was completed.

Health Effects

The oxidants health effects research program focuses primarily on providing human and animal dose-response data to re-evaluate the criteria documents for O_3 and NO_2. Emphasis was placed on assessing pulmonary function changes in healthy and potentially sensitive populations following oxidant inhalation. Accomplishments during 1982 included clinical studies which describe alterations in blood lipid levels following chronic ozone exposure. An increase in the level of circulating blood lipids correlates with increased risk of arteriosclerosis.

The program also focused on developing better models to extrapolate animal effects data to humans. Major accomplishments in this area included a mathematical model which predicts O_3 and NO_2 transport patterns in human lungs, using rodent dose-response data, and in in vivo comparisons between human and animal lung tissue and sensitivity to damage from oxidants.

Environmental Engineering and Technology

Research on VOC emission reduction technologies focused on the evaluation of technologies such as carbon adsorption, thermal oxidation, catalytic oxidation, capture systems, and flares. A pilot-scale testing facility for flares was constructed and a testing program initiated to determine industrial flare emissions for a variety of operating conditions and waste gases. Preliminary results indicate greater than 98 percent combustion efficiency under most test conditions. Under the catalytic oxidation project, a cooperative field test program was developed with several industries and full-scale testing was initiated. A joint demonstration was conducted with a major truck manufacturing company to evaluate a microprocessor control device for VOC control in metal coating operations. A compilation of VOC emission factor data for the ferrous metallurgical industries was completed.

Research on nitrogen oxides (NO_x) emission reduction technologies resulted in the following: (1) Scale-up and field evaluation of the heavy oil/low NO_x burner was initiated and NO_x emission reductions of 75-80 percent were achieved. (2) Bench-scale studies of in-furnace NO_x reduction were completed and a contract initiated to assess its applicability to domestically designed boilers firing United States coals. Bench-scale reductions as high as 80 percent were attained. (3) Performance testing of combustion modifications that are applicable to spreader stoker boilers was completed for a 100,000 lb steam/hr unit resulting in a 55-60 percent reduction in NO_x emissions. (4) Combustion modification technologies (e.g., reduced primary air, modification of fuel injection velocities) were evaluated on gas- and oil-fired refinery process heaters and on a coal-fired kiln. On the process heaters, NO_x emissions were reduced by 70 percent with gas firing and by 53 percent with oil firing. Cement kiln experiments identified combustion modifications capable of 40 percent NO_x reduction. (5) Experiments to identify how the chemical/physical

properties of coal are related to NO_x emissions were conducted to predict NO_x emissions for specific fuels. (6) An investigation of oxygen trim systems applied to pulverized coal-fired utility boilers was conducted to determine the extent to which other boilers could adopt this mode of operations to achieve NO_x reduction. (7) A pilot evaluation of a one million Btu per hour wall-fired furnace with simulated boiler conditions was conducted to test SO_2 removal by the limestone injection multi-stage burner (LIMB) process. Initial results indicate that on a retrofit basis removals of 50-60 percent are possible for NO_x and sulfur oxides (SO_x), and on a new boiler design basis removals of 60-80 percent are possible for SO_x and 50-70 percent for NO_x.

Environmental Processes and Effects

The primary focus of the research in this area in 1982 was the development and testing of air quality models for use by the States in the development of State Implementation Plans for ozone abatement strategies. Under this program, several urban scale photochemical air quality models for ozone were successfully tested and validated against the St. Louis area comprehensive air quality and emission data base.1/ In addition, a regional scale model for ozone was formulated, tested, and upgraded utilizing portions of the Northeast Regional Oxidant Study (NEROS) air data base. The regional model, when fully developed and validated, will be used by State and Regional offices to calculate the extent of ozone transport from one area to another. Although the regional model was formulated to predict regional ozone levels, it was also designed for use in modeling regional scale transport and deposition of fine inhalable particles and sulfates.

In the area of secondary (welfare) effects, research focused on assessing the impacts of ozone on major agronomic crops. A pilot assessment, involving ozone dose-response functions for soybeans, was conducted to test the feasibility of using crop yield simulation models for estimating the impacts of ozone on crop production. Regional economic assessments for crops grown in the Midwest and California are being completed. These will form the basis for national assessments of the economic impacts of ozone on the agricultural industry in the U.S.

B. MOBILE SOURCES

The Mobile Sources research program is designed to determine the health effects of motor vehicle emissions with emphasis on diesel exhaust and carbon monoxide (CO). The program is also designed to develop methods for measuring unregulated pollutants in automotive exhaust and for measuring or estimating actual population exposure to motor vehicle emissions.

Scientific Assessments

A report using recent Agency research data was prepared comparing the carcinogenic potency of diesel particulates to other polycyclic mixtures that are known to be carcinogenic. This report was prepared to assist in setting standards for particulate diesel emissions.

Monitoring

A computerized solid state data logger for use in personal monitoring instruments was developed, and 75 miniaturized CO personal air quality monitors were constructed incorporating an electrochemical sensing cell and the data logger. A field study design was completed to conduct a full-scale study of exposure to CO in an urban area. The field study will use the new personal monitors to measure the CO exposures of 1,000 persons in Washington, DC., and 500 person-days in Denver, Colorado. Data collection activities were initiated in the fall of 1982. A computer model was developed to simulate the daily activities of the urban population and their CO exposures and resulting carboxyhemoglobin levels.

Health Effects

The carcinogenic potency of particle bound organics from diesel exhaust was evaluated utilizing intratracheal instillation in hamsters and dermal exposure in mice. In addition, the in vivo distribution, metabolism, and carcinogenic potential of nitroaromatics were studied since these agents appear to account for a significant portion of the mutagenic activity observed in diesel particle bound organics. The biological activity of fractions of unregulated organic emissions (gaseous and particle components) resulting from combustion of a variety of fuels was evaluated using in vivo bioassays to detect gene mutations, DNA damage, chromosomal effects, oncogenic transformations, and cellular toxicity. Animal studies were conducted to ascertain the effects of chronic CO exposure on cardiovascular and central nervous system development in fetuses and newborn offsprings.

Environmental Processes and Effects

Research focused on characterizing the gaseous and particle emissions from a variety of motor vehicle categories. In particular, chassis dynamometer experimental test procedures were developed for use by researchers to characterize emissions under simulated in-use driving conditions. Data resulting from the characterizations will improve the motor vehicle air emissions data bases. Also, emissions from gasoline fueled passenger cars were characterized for volatile organic compounds, including aldehydes, using these test procedures. A major study on unregulated pollutants, gas phase toxic pollutants, and catalyst synthesized gases was completed.2/ An emissions characterization program was initiated to study gaseous and particulate emissions from in-use heavy-duty and gasoline powered trucks and buses.

C. GASES AND PARTICLES

The Gases and Particles research program focuses on air pollution problems associated with particulate matter, sulfur dioxide (SO_2), and lead, and the interactive effects of combining SO_2 and particles with other pollutants such as O_3 and NO_2.

Scientific Assessments

The air quality criteria document for sulfur oxides and particulate matter was completed in 1982. Copies of the final document are scheduled to be published at the time the standard is proposed in accordance with Section 109 of the Act.

National workshops were convened to collect data and discuss scientific issues pertinent to the rewrite of the air quality criteria document for lead. The final draft is scheduled to be completed in 1984.

Monitoring

In 1982, the new 10-micrometer (um) samplers for particulate matter were tested successfully and installed in 24 stations in the Inhalable Particulate Network (IPN). The results from these stations will be compared to the results from the 15 um samplers in 76 other IPN stations to help assess the impact of revised standards for particulate matter.

A study was carried out in Philadelphia to estimate the influence of roadway traffic on atmospheric levels of particles and various elements, especially lead. Another study tested the ability of a new particulate matter sampler, the Wide-Range Aerosol Classifier, to size-classify particles in three different types of urban atmospheres and in a nonindustrial comparison area.

Quality assurance activities for the IPN, the NAMS/SLAMS Network, and the trace metals network continued. A second prototype personal monitor for particles was built and received further testing.

Health Effects

Dose-response studies in mice showed that pulmonary infection, caused or exacerbated by particle inhalation, may result in lung fibrosis. A study of the acute effects of volcanic ash inhalation showed only very slight effects on animal pulmonary physiology, structure, biochemistry, and host-defense mechanisms. Animals with emphysema were found to be less susceptible than healthy animals to pulmonary structure changes following subchronic exposure to ammonium sulfate and ammonium nitrate.

An important advance was made in the area of extrapolation modeling from animals to humans. A model was developed which used lung branchings to determine particle deposition in the lungs of different animal species.3/

Environmental Engineering and Technology

In the SO_2 area, a full scale assessment of the use of adipic acid to enhance limestone flue gas desulfurization (FGD) systems confirmed that SO_x removal exceeding 95 percent can be achieved and that the use of this technology should enable both new and existing utility boilers to

more easily and cheaply comply with SO_x emission regulations. The cost-effective advantage of combined SO_x and particle control using dry-scrubbing with fabric filter baghouses was assessed and appears to be superior to conventional FGD systems for certain low and medium sulfur content coals.

Initial tests of the limestone injection multi-stage burner (LIMB) process on a tangentially-fired pilot furnace were conducted. Results indicate that LIMB may be suitable for use in these furnaces.

In the particulate area, pilot-scale testing of two types of two-stage electrostatic precipitators was initiated to determine their potential for commercial applications for low sulfur coal fly ash collection. Projections suggest that particle collection costs could be reduced by up to 50 percent. Pilot-scale testing of an electrostatically enhanced fabric filter (ESFF) baghouse using reverse air cleaning (typical for utility power plants) showed that a substantial reduction of pressure drop can be achieved (up to 50 percent). ESFF continued to show similar improvements for the pulse-jet mode, the mode most commonly used for industrial boilers. In addition, field evaluations were completed for magnetic high-gradient filtration of magnetically susceptible dusts and for road carpets for reducing fugitive emissions. Field studies were also undertaken in the iron and steel area to establish the long-term effectiveness of sprayed-on additives for fugitive dust control on unpaved roads.

Source characterizations and development of size-specific emission factors for major sources of particulate matter emissions continued. Results from the source characterizations are being combined with existing data to develop size-specific emission factors for sources including paved, unpaved, and industrial roads, iron and steel, nonferrous, cement, lime, asphaltic concrete, ferroalloy, kraft pulp mills, iron foundries, and combustion processes. These emission factors are needed by the States for revision of State Implementation Plans.

The Seventh FGD Symposium, co-sponsored with the Electric Power Research Institute, the Fourth Symposium on the Transfer and Utilization of Particle Control Technology, and the Fourth Symposium on Iron and Steel Pollution Abatement Technology, co-sponsored with the American Iron and Steel Institutes, were conducted.

Environmental Processes and Effects

Research in the gases and particles area focused on the transport and fate of SO_2 and particles as well as their effects on agricultural crops, materials, and visibility.

In the air modeling research area, work was conducted on the development of improved air quality dispersion models for use in complex terrain. The research concentrated on plume impaction studies in elevated terrain. The results of the Small Hill Impaction Study #1 were published in the fall of

1982 and will be used to evaluate the complex terrain models.4/ A study of plume impaction on a two-dimensional ridge was conducted in the fall of 1982. The Green River Ambient Model Assessment Study Group completed development of a mountain valley air quality model.

An interim urban and mesoscale model that addresses the 1-hour and 24-hour average of SO_2 and particles needed for SIP revisions was developed. Research was also conducted on regional scale model development in order to understand better the meteorological conditions that lead to prolonged elevated pollutant episodes.

Under the Source Apportionment Methods (SAM) program, the second receptor modeling workshop was held in the spring of 1982 to determine the reliability of currently available source apportionment methods. Two major field studies were completed. The first was conducted in Philadelphia to provide source and ambient data for developing and evaluating urban particulate dispersion and receptor models, and the second was conducted in Denver to determine the sources of visibility-reducing particles.

In the area of secondary (welfare) effects research, field and greenhouse studies were conducted to assess the interactive effects of SO_2, O_3, and NO_2 on agricultural crop growth and yield. This research was based on preliminary information that indicated that these pollutants, acting in combination, may affect crops differently than if crops were exposed to the pollutants individually. Also, research conducted on the quantification of pollutant damage to materials in economic terms resulted in several reports and journal articles on an economic benefits model for materials and on the soiling of material surfaces under various environmental conditions.

D. HAZARDOUS AIR POLLUTANTS

The pollutants covered by the hazardous air pollutant (HAP) research program are those air pollutants that are either currently regulated or are potential candidates for being regulated under Section 112 or Section 111(d) of the Clean Air Act.

Scientific Assessments

Draft comprehensive health assessment documents for the following air pollutants underwent initial review by the Science Advisory Board (SAB): methylene chloride, methyl chloroform, fluorocarbon 113, toluene, perchloroethylene, carbon tetrachloride, and acrylonitrile. A draft report on the carcinogenic effects associated with coke oven emissions also underwent SAB review in 1982.

Comprehensive health assessments were initiated for eight chemicals: ethylene oxide, ethylene dichloride, chloroform, epichlorohydrin, chromium, manganese, nickel, and vinylidene chloride. Updated assessments were started for asbestos, vinyl chloride, and cadmium.

Monitoring

As a result of stability tests on quality assurance materials, the organic audit repository was expanded to 40 different compounds. Thirteen audits were completed on source test contractors. A benzene Standard Reference Material (SRM) was issued. A report on quality assurance guidelines for ambient air programs of national scope was peer reviewed and was distributed.5/ During 1982, validated data on benzo-a-pyrene and trace elements including arsenic, chromium, and cobalt were obtained. This is an annual update obtained from analysis of glass fiber filters from State and local control agencies.

Health Effects

Short-term bioassays were developed and used to identify mutagenic fractions in ambient air. Similar assays were used to determine that inhalable particulate emissions from wood stoves in the home are 20-600 times greater than home heating oil inhalable particulate emissions. In vitro studies of the non-carcinogenic effects of toluene at higher than ambient concentration levels showed both immunological effects (increased susceptibility to streptococcus infection) and neurobehavioral effects (increased sleep time) in animals.

Environmental Engineering and Technology

In 1982, emphasis was placed on collecting emission data and evaluating emission reduction technologies to assist the review and development of National Emission Standards for Hazardous Air Pollutants (NESHAPS). An analysis of potentially hazardous organic emissions from ferroalloy production was completed. These results showed some furnaces generate significant quantities of these pollutants. However, properly operated control devices can significantly reduce discharge of these materials into the atmosphere. Research continued on generic VOC emissions reduction technologies which may have application to the control of hazardous air pollutants as well.

Environmental Processes and Effects

Emphasis was placed on quantifying the levels of potential hazardous air pollutants and determining their fate in the atmosphere. In particular, a data base was compiled summarizing the current state of knowledge of volatile organic compounds (VOC's) in the ambient air and photolytic decomposition rates were determined for a selected number. Also, research was conducted on some HAP's having long atmospheric residence times to determine their rates of physical loss to the atmosphere through dry and wet deposition

and decomposition. Preliminary ambient air characterization studies were concluded in ten urban areas on a selected number of potentially hazardous trace VOC's as an initial step towards mapping their natural, spatial, and temporal variabilities.

E. ACID DEPOSITION

Research on the sources, effects, and possible mitigation strategies for controlling acid deposition continues to be a high priority for EPA. During 1982, the Agency worked closely with the other members of the Interagency Task Force on Acid Precipitation to more clearly establish and verify the relationship between emissions and deposition, determine the dose-response functions and the extent of potential impacts, and assess the relative costs and benefits of possible mitigation strategies. Research on acid deposition is organized by the following Task Force sub-groups: Natural Sources, Man-made Sources, Atmospheric Processes, Deposition Monitoring, Aquatic Effects, Terrestrial Effects, Effects on Materials and Cultural Resources, and Assessments and Policy Analysis. EPA contributed significantly to the following major accomplishments achieved by the Task Force in 1982 as described below.

Natural Sources

Techniques for reliable field measurement of sulfur and nitrogen emissions from natural sources were developed and tested. In addition, preliminary measurements of natural sulfur compounds in the ocean were obtained that suggest emissions from marine sources may contribute significantly to the production of acid precursors.

Man-made Sources

A study on emission sources was completed that suggested that local petroleum combustion, as well as coal combustion, could contribute significantly to the production of acid precursors. Also, EPA continued to develop models to predict the cost and emissions changes from utilities and industries based on various possible control strategies.

Atmospheric Processes

In 1982, the first comprehensive isopleth maps describing the distribution of major chemical species over North America were produced. The planning and initial testing for a major field experiment to be performed in 1983 that will track the movement of tracer gases released in the Midwest and Canada over hundreds of miles was completed. In addition, initial observations that confirm the importance of clouds in transforming sulfur dioxide to acidic sulfates were obtained.

Deposition Monitoring

Three research sites to test improved methods of monitoring wet and dry deposition were established, precipitation chemistry data were analyzed, and acid deposition maps for North America were produced. In addition, field measurements of dry deposition obtained from different prototype methods were compared and continued efforts to develop reliable techniques for routine measurement of dry deposition were compared.

Aquatic Effects

A preliminary, qualitative map of the nation indicating regions where surface waters are likely to be most sensitive to acidification was produced, and a preliminary survey of drinking water in the Northeast was completed. In addition, long-term monitoring of aquatic resources (chemistry and biota) in key sensitive regions was initiated, and existing information on mitigation strategies (e.g., liming) was evaluated, and field and laboratory studies to examine their effectiveness and limitations were initiated.

Terrestrial Effects

Extensive long-term studies were initiated to determine whether acid deposition has caused changes in the rate of growth and species composition in forests. In addition, a study was conducted to evaluate whether acid deposition predisposes pine seedlings to stress factors. Results indicated that there was not an increase in susceptibility to insect or disease attack, and in some seedlings, there was an increased resistance to disease.

Agricultural experiments using simulated acid deposition also were conducted. These experiments did not indicate injury to potato or to forage plants. Experiments involving corn and soybeans gave mixed results with yields decreasing under some circumstances but increasing under others. A study of soils in the Southeast, mid-Atlantic coast, and Northeast was conducted which showed variable responses to acid deposition relative to mobilization of toxic metals and leaching of nutrients.

Studies were conducted which indicate that southeastern watersheds are accumulating sulfur. The importance of this change in sulfur concentration on the chemical and biological characteristics of the surface waters is not clearly understood. Finally, several studies were conducted on forest canopies that indicated the situation is complex since they can either decrease or increase the acidity of rain traveling through them.

Effects on Materials and Cultural Resources

Research to determine possible acid deposition related damage to historical monuments was initiated and field sites for testing materials and estimating the relationship of deterioration rates to acid deposition

were established. Information on the past deterioration of materials was analyzed and documentation of possible protective treatments for materials was begun.

Assessments and Policy Analysis

A first draft of a document providing a state-of-the-art report of what is known about acid deposition and its effects was prepared for scientific review. Research to develop methodologies for conducting integrated assessments of the significance of various scientific and economic information was initiated. Methods for estimating the uncertainty in models and the implications for formulating management strategies were developed and tested.

IV. DEVELOPMENT OF NATIONAL AMBIENT AIR QUALITY STANDARDS

The 1977 Clean Air Act Amendments required EPA to review and revise, if necessary, all of the national ambient air quality standards (NAAQS). Reviews of all seven NAAQS were in progress during 1982.

In 1982, EPA developed material to support revocation of the existing NAAQS for hydrocarbons (which was originally established as a guide for attaining the NAAQS for photochemical oxidants) on the basis that it was no longer appropriate and because there are now much more sophisticated techniques available for designing control strategies for photochemical oxidants (ozone). Promulgation of this action was scheduled for 1983.

During 1982, work continued on finalizing EPA's proposal of August 18, 1980, to revise the NAAQS for carbon monoxide.1/ Additional review and comment from the public and by the Clean Air Scientific Advisory Committee (CASAC) was conducted in 1982 on several new issues that were raised since proposal.2/

The revision to the criteria document for nitrogen oxides (NO_x) was completed in 1982.3/ The NO_x staff paper,4/ which interprets the critical studies in the criteria document for use in the standard-setting process and provides a range of values which the staff feels is most appropriate for selecting the level of the air quality standard, was reviewed and concurred on by CASAC. Proposal of standards is expected in 1983.

CASAC concurrence on the scientific accuracy and completeness of the staff paper for particulate matter was received in January 1982.5/ Work on the regulatory support documents was nearly completed and a proposal is expected in 1984.

In 1982, CASAC conducted two public reviews of the staff paper for sulfur oxides (SO_x) and their recommendations to the Administrator are expected in 1983. A proposal to reaffirm or revise the SO_x standards is expected in 1984.

Work on revising the criteria documents for ozone and lead was initiated in late 1981, with initial drafts of chapters for the documents completed in 1982. Public workshops on the draft criteria document chapters were held in late 1982. Work on the regulatory support documents was also initiated in 1982. Release of the first external review drafts of the criteria documents is scheduled in 1983.

Also in 1982, the Agency continued its efforts to develop methodologies for using risk assessment in setting NAAQS, as has been suggested by a number of groups, including the National Commission on Air Quality. The CASAC has agreed to set up a subcommittee to assist and advise EPA in applying risk assessment to the lead NAAQS review.

V. STATUS OF AIR QUALITY MANAGEMENT PROGRAMS

A. STATE IMPLEMENTATION PLANS

1982 Attainment of NAAQS

One set of provisions included in the 1977 Amendments to the Clean Air Act addressed those areas that had not yet attained national ambient air quality standards (NAAQS). These provisions required that the primary (health-related) NAAQS for particulate matter, sulfur dioxide, and nitrogen dioxide be attained by December 31, 1982. For ozone and carbon monoxide, the Act also required attainment of the primary NAAQS by December 31, 1982, except for those areas of the country which demonstrated that attainment by that date was not possible even after application of all reasonably available control methods. For those areas, attainment of the primary NAAQS had to be as expeditious as practicable, but no later than December 31, 1987. In late 1982, EPA prepared a Federal Register notice for publication in early 1983 that identified portions of 32 States and Territories that EPA concluded would not meet the relevant requirements of the Act. Unless information to the contrary was received from the public, EPA proposed to find the State Implementation Plans (SIP's) inadequate for these areas.

1982 SIP Revisions for Ozone and Carbon Monoxide

Certain areas of the country that demonstrated that the primary NAAQS for ozone (O_3) or carbon monoxide (CO) could not be attained by December 31, 1982, even with the application of all reasonably available control measures, were granted an extension of the attainment date until no later than December 31, 1987. The Clean Air Act required that all States receiving such an extension submit a revised SIP by July 1, 1982, demonstrating attainment no later than the end of 1987. A total of 31 States requested and were granted compliance date extensions and were therefore required to submit revised SIP's.

Also in late 1982, EPA prepared a Federal Register notice for publication in early 1983 that pertained to the approval or disapproval of SIP's for the O_3 and CO extension areas. As of the end of 1982, two SIP's had received final approval by EPA. All other SIP actions described in the Federal Register notice would either be proposed approvals or proposed disapprovals. In that notice, EPA proposed disapproval of plans for either O_3, CO, or both for 17 of the 31 States.

Lead SIP's

In October 1978, EPA published a national ambient air quality standard for airborne lead under Section 109 of the Clean Air Act.1/ Section 110 of the Act required each State to adopt and submit to EPA within nine months (i.e., by July 1979) a plan to implement that standard. The Act further

required EPA to approve or disapprove these SIP's within four additional months (by November 1979) and to promulgate SIP's within two additional months beyond that (by January 1980) for States that did not meet the requirements specified in the Act.

On July 30, 1982, the Natural Resources Defense Council (NRDC) and other parties filed suit in the U.S. District Court for the District of Columbia to require EPA to promulgate lead SIP's for those States that had not yet submitted them and to approve or disapprove lead SIP's that had been submitted but on which EPA had not taken final rulemaking. The Lead Industries Association and St. Joe Minerals Corporation intervened in the suit on behalf of EPA. By the end of 1982, the parties to the suit had met several times to try to negotiate a settlement to the suit that would provide schedules for submission of lead SIP's.

Through 1982, EPA had reviewed and taken final action on 21 complete SIP's for lead and 7 partial SIP's. For lead, a "complete" SIP is a statewide plan that covers all areas of the State; a "partial" SIP is a plan that has been approved for some but not all areas of the State. Six other complete lead SIP's had been submitted to EPA but EPA had not taken final action in them in 1982. There were 29 States and Territories that had not submitted complete lead SIP's to EPA through 1982. At least 12 of the States or Territories without approved lead SIP's appeared to be in attainment already with the NAAQS for lead. In others, the problems were generally found in local areas near stationary sources of lead and were not statewide.

EPA took action to reduce lead emissions from motor vehicles, the major source of lead emissions, as early as 1973. On October 29, 1982, EPA amended the rules governing fuel and fuel additives, known as "lead-in-gas phasedown."2/ These amendments, which further limit the lead content in gasoline, will reduce lead air pollution from mobile sources (the principal source of airborne lead pollution) by 34 percent more than would have occurred under the former regulations. In fact, the reduction of lead emissions from mobile sources since 1973 has led to a substantial decrease in the levels of airborne lead pollution in many areas including a number of the States without approved lead SIP's.

B. PROCESSING OF SIP REVISIONS

One of the most significant management initiatives implemented during 1982 was the reduction of the SIP backlog. A number of problems had arisen in the past in the processing of SIP revisions, all causing the review to take too much time and causing poor relations with the States. Efforts were focused in 1982 on changes to the SIP review process which would accelerate review of routine and noncontroversial SIP actions and reduce the duplication of effort between the States, the EPA Regional Offices, and EPA Headquarters. This helped bring about better working relationships between EPA and the States and reduced a great deal of the uncertainty that the States had felt toward EPA regarding their SIP revisions. In 1981, three improved SIP processing procedures were developed, tested, and

implemented. These were the elimination of duplicative review, immediate final rulemaking, and parallel processing. These were formally implemented on September 4, 1981, and provided the foundation for SIP activity in 1982.3/

Prior to the implementation of these three procedures, the inventory of SIP submittals awaiting Regional Office and Headquarters action was growing because EPA was only able to process SIP actions at two-thirds the SIP submittal rate. A project was begun in late 1981 and continued into 1982 to substantially eradicate this inventory. A reduction of 93 percent was achieved by July 1, 1982. The continuing objective is to process SIP revisions as rapidly as possible in order to avoid any future backlogs.

C. NATIONAL AIR AUDIT SYSTEM

The Federal program for air quality management under the Clean Air Act is entering a period where more programs can be delegated to, and assumed by, State and local air pollution control agencies. Examples of this process include increased emphasis on delegations of authority for new source performance standards (NSPS), national emission standards for hazardous air pollutants (NESHAPS), and prevention of significant deterioration (PSD). This decreased Federal involvement in State decisions will require effective oversight of national air quality management programs.

Of primary concern is the need to develop a uniform audit process which enables the Regions to evaluate each State's performance and adherence to national requirements and, at the same time, promotes and enhances a cooperative working relationship between EPA and State and local air pollution control agencies. In an effort to ensure equitable treatment of States in the audit process, EPA Headquarters personnel consulted with Regional Offices and representatives from State and local agencies in 1982 to develop comprehensive guidance for implementation of a nationally consistent air audit system. With the assistance of State and local air pollution control agencies, EPA intends to develop standardized audit criteria and measures in 1983 and begin a pilot national audit program in 1984.

D. EMISSIONS TRADING

Emissions trading includes several alternatives to traditional regulation. These alternatives do not alter existing air quality requirements but simply give States and industry more flexibility to meet these requirements. Bubble trades and emissions reduction banking are two of the major emissions trading concepts being promoted by EPA.

Bubble Trades

Bubble trades allow existing plants (or groups of plants) to treat all of their emission points as though they were under a giant bubble and reduce or eliminate pollution controls where costs are high, in exchange for

compensating increased control at emission sources where control costs are low. They give firms increased compliance flexibility, meet current or future pollution control requirements more quickly, make innovative control approaches profitable, and can result in significant savings over the costs of conventional controls. In 1982, EPA issued a proposed emissions trading policy to replace the original bubble policy and to streamline procedures, giving States and industry more opportunities to use bubbles in many more circumstances and geographic areas.4/ EPA plans to issue the policy in final form after considering the comments that were submitted on the proposal. In addition, in 1982 EPA approved or proposed to approve 33 bubbles saving their users more than $120 million over the cost of conventional pollution controls, with many producing energy savings and greater emission reductions than traditional regulation. Over 100 other bubbles averaging $2 million each in savings were under review at the State or Federal level.

Emissions Reduction Banking

Emissions reduction banking lets firms get credit for surplus emission reductions and store such emission reduction credits (ERC's) in a legally-protected manner. ERC's can be "banked" (stored) and used in bubble applications to meet control requirements for existing plants more flexibly and efficiently, as offsets to support economic growth in areas not meeting air quality standards, or in "netting" to exempt certain expansions or modernizations from new source review. Banking rules can speed trades between firms, expand opportunities for bubbles, and encourage the production of cheap ERC's at optimal times. Banking systems also provide the certainty needed for firms to invest in ERC's when meeting other control requirements, creating a pool of readily available credits that make trading easier and speeds permit issuance while assuring progress toward clean air. As of December 31, 1982, four areas (Louisville, KY; San Francisco, CA; Puget Sound, WA; and the State of Oregon) had formal banking systems in operation and at least 12 other areas had drafted or proposed full banking provisions.

E. BACT/LAER AND AIR QUALITY MODELING CLEARINGHOUSES

New or modified facilities that are to be constructed in areas of the country that are currently attaining the national ambient air quality standards are required by the Clean Air Act to install best available control technology (BACT). In those areas of the country that have not yet achieved compliance with the air quality standards, new or modified facilities are required to meet the lowest achievable emission rate (LAER) for that particular type source. Permits to construct new or modified sources are issued by State and local agencies only after the sources agree to comply with either BACT or LAER requirements. Often an air pollution control agency will need to establish BACT or LAER requirements either for a source type completely new to them or for a source type with which they have had only minimal experience. In these cases, the permitting agency may not be knowledgable of the more recent advances in control technology for such sources and it is extremely helpful if the agency can refer to BACT or LAER determinations made by other control agencies.

EPA established the BACT/LAER clearinghouse several years ago in order to assist State and local air pollution control agencies by promoting the sharing of air pollution control technology information. In 1982, EPA revitalized the BACT/LAER clearinghouse by increasing participation by State and local agencies and by improving the mechanisms whereby input is received and output is distributed.

The primary output of the BACT/LAER clearinghouse is a report of information that has been obtained from the BACT/LAER determinations made by the various control agencies. The most recent report entitled "BACT/LAER Clearinghouse--A Compilation of Control Technology Determinations (May 1982)" contains over 550 BACT/LAER determinations.5/ An updated compilation containing approximately 700 determinations will be distributed in 1983.

EPA's air quality modeling clearinghouse was established in November 1980. The primary purposes of the clearinghouse are to provide: (1) a mechanism whereby the proposed acceptance by a Regional Office of a nonguideline model or alternative techniques may be reviewed for national consistency before final approval by the Regional Administrator; (2) a mechanism whereby the indepth technical evaluation and/or performance evaluation of a proposed technique may be reviewed by those EPA personnel who are most familiar with the types of techniques to be employed; and (3) a communication outlet for EPA's experience with the use of nonguideline models, data bases or other deviations from current guidance. To accomplish these purposes, the clearinghouse promotes awareness of EPA modeling policies, develops and maintains a historical record of modeling decisions, develops clarifications of existing modeling guidance for special situations, reviews proposed actions which involve interepretation of or deviation from modeling guidance, and communicates the results of significant decisions to all regulatory users in the Agency.

Clearinghouse activities for 1982 included review of dispersion modeling acceptability in 25 instances while 5 "bubble" actions and at least an equal number of prevention of significant deterioration (PSD) modeling evaluations were performed.

F. NEW SOURCE REVIEW AND PREVENTION OF SIGNIFICANT DETERIORATION

Significant progress was made by the Agency in 1982 in carrying out its Act responsibilities as they relate to the preconstruction review of new and modified stationary sources:

PSD Program Transfer

EPA made considerable progress in transferring responsibility for implementing the existing prevention of significant deterioration (PSD) regulations to the States and local agencies. Through 1982, 26 State and local agencies had either full delegation of the PSD program or an approved PSD SIP, and 18 had partial responsibility for the PSD program, for a total of 44 States and locals. This compares to a total of 31 States and locals with either full or partial responsibility for the PSD program at the end of 1981.

PSD Permit Reviews

To expedite its issuance of PSD permits, EPA management established an accountability system to track Agency performance in reviewing PSD applications in those cases where EPA is the responsible reviewing authority. This system showed that the average reviewing time for issuing PSD permits from the point of complete application fell from approximately eight to seven months during 1982.

CMA Agreement

On August 7, 1980, EPA promulgated extensive revisions to its PSD and nonattainment new source review regulations.6/ Numerous groups legally challenged these regulations. These cases were consolidated as Chemical Manufacturers Association v. EPA.7/ In attempting to resolve the pending concerns and to explore certain regulatory reform measures, the Agency entered into a litigation settlement with the industrial parties on February 22, 1982. Pursuant to this settlement, EPA agreed to propose certain regulatory changes. One change to which EPA agreed pertained to vessel emissions. EPA agreed to complete rulemaking proposing to no longer include vessel emissions in applicability determinations or ambient assessments for secondary emissions. Final promulgation of this provision appeared in the Federal Register of June 25, 1982.8/ Other rulemaking packages to implement the litigation settlement were in preparation in 1982. These other packages addressed the topics of netting and offsetting baseline, changes to the particulate matter PSD increments, and various other issues such as fugitive emissions, Federal enforceability, "buffer zones," secondary emissions, and prior shutdowns.

G. IMPLEMENTATION GUIDANCE FOR REVISED PARTICULATE MATTER STANDARDS

In anticipation of the proposal in 1983 of revisions to the national ambient air quality standards for particulate matter, EPA has been developing material relevant to the implementation of those standards. The material includes regulatory revisions, Agency policy, and various guideline documents. The areas covered by the material are State Implementation Plan requirements for attainment and maintenance of air quality standards, air quality monitoring, and prevention of significant deterioration/new source review. EPA intends to propose this material for public comment along with the proposal of the ambient standards.

H. VISIBILITY PROTECTION

Section 169A of the Clean Air Act establishes as a national goal "the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution." On December 2, 1980, EPA promulgated regulations implementing this section.9/ Subsequent to this promulgation, ten organizations filed for judicial review of the visibility regulations. In addition, six organizations filed petitions for administrative reconsideration of

the rules. Judicial review of the regulations has been stayed pending the Agency's evaluation of the administrative petitions. Additionally, on December 20, 1982, the Environmental Defense Fund, Inc., National Parks and Conservation Association, Colorado Mountain Club, et.al., filed suit in the United States District Court for the Northern District of California seeking to compel the Agency to promulgate State plans under Section 110(c) of the Clean Air Act for those States which have not submitted such plans.

I. INTERSTATE AIR POLLUTION

Section 126 of the Clean Air Act provides a mechanism for a State or local authority to petition the Administrator if there is concern that out-of-State sources interfere with their ability to meet Federal requirements of the Clean Air Act. Under this section, a total of 7 States and 1 county have filed 18 petitions with EPA through 1982. Twelve of these petitions from three States (New York, Pennsylvania, and Maine) have been consolidated because they all address emissions from many sources in a seven-State region claiming to result in long-range transport and transformation of pollutants. The remaining six petitions involve a specific source contributing to a local air pollution problem.

In 1982, the Agency reached a final decision on the Section 126 petition brought by Jefferson County, Kentucky, against the Gallagher power plant in Indiana.10/ The Agency concluded that the Gallagher plant did not interfere with Jefferson County's ability to meet Federally required standards. That determination has been challenged in court by Jefferson County. The other petitions were under review or were being resolved through negotiations with the parties involved.

J. TALL STACKS AND OTHER DISPERSION TECHNIQUES

Section 123 of the Clean Air Act requires that stationary sources of air pollution not be allowed to take credit for having stacks that are higher than that defined by "good engineering practice" (GEP) and thereby evade more stringent emission limitations. In addition, Section 123 does not allow sources to take credit for any other type of air pollution dispersion technique. The section also requires the Administrator to promulgate regulations to implement these requirements. EPA promulgated these regulations on February 8, 1982.11/ In July 1982, EPA denied petitions to reconsider these regulations.12/ The regulations established methods to determine GEP stack height and define other dispersion techniques. Section 123 allows the use of a certain dispersion technique known as an intermittent control system if this technique was implemented prior to December 31, 1970. An intermittent control system is one which varies the rate of pollutant emissions according to meteorological conditions. The Agency is working on a regulation which will define the requirements of an implemented system. This rule will be proposed in 1983.

There has been a court challenge to the promulgated stack height rules filed by the Sierra Club, Natural Resources Defense Council, and the Commonwealth of Pennsylvania. The petitioners question several aspects of the rule including stack height credit for plume impaction on elevated terrain, the definition of a stack, and the use of a formula for determining GEP stack height. The petitioners filed their arguments with the court in October 1982. The ruling from the court is not expected until 1983.

K. AIR POLLUTION TRAINING

EPA provides technical training in the abatement and control of air pollution. This training includes short course presentations (three to five days in length), self-study courses, technical assistance to others who conduct training, and the support of traineeships and fellowships for graduate air pollution training.

During 1982, EPA conducted 27 short courses in 8 different subject areas for a total of 785 students. These courses were presented in locations across the U.S. by 7 universities designated as area training centers. Technical assistance was provided to State and EPA Regional Offices to conduct 9 additional courses reaching a total of 194 students.

In an effort to reach more air pollution personnel and to support the transfer of control responsibilities to the States, EPA expanded the numbers and subjects of self-study courses. Early in the second half of 1982, ten new self-study courses were added. During the last 5 months of the year, just under 500 students applied for these courses. (This represents an increase of over 750 percent compared with the monthly average for the first 7 months of 1982.)

As an additional means of developing qualified personnel, EPA supported 26 graduate traineeships/fellowships to employees of State and local air pollution control agencies. These awards are for both part-time and full-time study and the end objective is generally a graduate degree in the field of air pollution control.

VI. CONTROL OF STATIONARY SOURCE EMISSIONS

A. NEW SOURCE PERFORMANCE STANDARDS (NSPS)

The Administrator is required by Section 111 of the Clean Air Act to establish national standards of performance for source categories that may cause or contribute significantly to air pollution which may reasonably be anticipated to endanger public health or welfare. Such standards apply to new and substantially modified sources and are generally referred to as new source performance standards (NSPS).

During 1982, new source performance standards were promulgated for seven new categories: phosphate rock preparation 1/, lead battery manufacture 2/, asphalt roofing manufacture 3/, surface coating of large appliances 4/, surface coating of metal furniture 5/, metal coil surface coating 6/, and graphic arts (rotogravure printing).7/ The existing NSPS for petroleum liquid storage (equivalency determination) 8/ and gas turbines were revised.9/ Standards were proposed for three new categories: metallic minerals processing 10/, synthetic fiber manufacturing 11/, and petroleum dry cleaning.12/ Revisions were proposed for four phosphate fertilizer processes 13/, lime plants 14/, and the industrial surface coating of automobiles and light-duty trucks.15/,16/ Standards development programs now underway are planned to result in the promulgation of 13 and the proposal of 24 standards in 1983.

B. NATIONAL EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)

Standards development work continued in 1982 for coke oven emissions sources in the iron and steel industry and for major benzene emissions sources in the chemical and petroleum industries. Regulations under Section 112 of the Clean Air Act were proposed in 1980 and 1981 for four source categories of benzene emissions: maleic anhydride manufacturing 17/, ethylbenzene/styrene manufacturing 18/, and benzene storage and fugitive leaks of benzene in petroleum and chemical plants.19/,20/ A public hearing was held and public comment received. As a result of a court order, EPA plans to either propose NESHAP regulations or make negative determinations on several sources of inorganic arsenic in 1983.

The Science Advisory Board (SAB) completed their review of comprehensive health assessment documents in 1982 for acrylonitrile, toluene, and chlorofluorocarbon-113. SAB reviews on draft documents for methyl chloroform, methylene chloride, coke oven emissions, carbon tetrachloride, and perchlorethylene were also conducted in 1982, with final reviews scheduled in 1983. These documents constitute the health basis for Agency decisions on whether to regulate these compounds as hazardous air pollutants under Section 112 or Section 111(d) of the Act or whether other appropriate action is necessary. Health assessment documents on 11 other pollutants are scheduled for initial SAB review in 1983.

C. DELEGATION OF NSPS AND NESHAP

EPA made considerable progress in 1982 in delegating responsibility for implementing the NSPS and NESHAP programs to the states and local air pollution control agencies. At the beginning of 1982, 8 States or locals had accepted full delegation for applicable NSPS and 21 had accepted full delegation for NESHAP. At the end of 1982, these delegations increased to 31 for NSPS and 45 for NESHAP.

VII. STATIONARY SOURCE COMPLIANCE

A. MAJOR STATIONARY SOURCES

The goal of the Clean Air Act is to protect public health and welfare and enhance the quality of the nation's air. The stationary source compliance program is designed to assure compliance with air emission standards by stationary sources of air pollution, including such major facilities as power plants, steel mills, smelters, and refineries. In addition to ensuring compliance with emission limitations contained in State Implementation Plans (SIP's), EPA and delegated States are responsible for ensuring that sources comply with new source performance standards (NSPS) and national emission standards for hazardous air pollutants (NESHAP).

In the late 1970s, EPA embarked on a program to bring sources which had never installed control equipment into initial compliance with applicable air quality regulations. Through the combined efforts of industry, States, and the Federal government, the goals of this program had been largely achieved by the end of 1982, when over 94 percent of the sources in the country were reported as achieving initial compliance or being in compliance with schedules to install controls. (This figure understates the progress which was made since there was growth of over 2,000 additional SIP sources during this period.) Among the sources brought into compliance through this effort were some of the largest contributors to the nation's air pollution problems, with many of them having been in violation for several years.

Since the conclusion of this effort, the compliance rate for major sources has been stable. This is an expected outgrowth of the present maturity of the program. EPA and the States are not only continuing their efforts to ensure that the remaining sources achieve initial compliance, but also focusing on ensuring that controls which have been installed are operated and maintained in a manner that maximizes their environmental benefits.

Illustrative of the importance of this effort is a study by the National Commission on Air Quality (NCAQ), which found that 71 percent of 180 sources reported as being in compliance had documented incidents of excess emissions 25 percent above the allowed emissions level, with the primary cause being improper operation and maintenance practices.1/

To realize the maximum environmental benefit of the investments made to date, programs to assure proper operation and maintenance are being developed and made available to the States. In 1982, EPA committed itself to work with States and local agencies on a voluntary basis to develop and test various elements of a program designed to ensure continuing compliance. In addition, EPA is providing an increasing level of technical support to strengthen State programs as well as direct technical assistance when requested.

Enforcement actions must be prioritized to ensure that the maximum environmental benefits are achieved. EPA, in cooperation with the States, has been developing prioritized lists of the most significant violating sources to focus resources where the greatest environmental gains can be made. EPA is looking to the States to assume the primary role in bringing enforcement actions against these sources and will, as previously discussed, provide technical support as needed. Where the State efforts are not successful, EPA is ensuring compliance by bringing a Federal administrative or judicial action.

A fully integrated compliance data system (CDS) is essential as a management tool to direct limited resources in maximizing environmental results. EPA is continuing to improve its CDS and is working with several States to develop or adapt their own integrated systems to make them compatible with CDS. This will improve the quality of the State data in the system as well as minimize reporting burdens on the States.

New source performance standards and hazardous air pollution programs remain a high priority of the air enforcement program. EPA is actively encouraging delegation of existing NSPS and NESHAP, although a residual level of EPA enforcement activity is still required. Substantial effort has been made and is likely to continue with respect to enforcing NESHAP regulations for vinyl chloride and a considerable effort is anticipated as new NESHAP regulations are promulgated. While both NSPS and NESHAP sources currently exhibit low violation rates, 3.1 percent and 1.4 percent, respectively, EPA and the States are committed to ensuring that these rates remain low despite significant growth in the number of sources subject to these standards.

B. 1982 DEADLINE ENFORCEMENT POLICY

On September 20, 1982, the Administrator issued a policy on enforcement against sources in primary nonattainment areas that are not in compliance with the Clean Air Act by December 31, 1982. The policy recognizes that courts have equitable jurisdiction to fashion relief that allows a source to continue to operate in violation beyond 1982 while taking steps to come into compliance expeditiously. The policy sets forth criteria to determine the relief the Agency should seek in each case, particularly whether a compliance schedule is appropriate or whether the Agency should seek closure of the source until it can demonstrate compliance. To justify continued operation of the source, the Agency must determine that the public interest in continued operation outweighs the environmental cost of the additional period of noncompliance.

If the Agency determines that continued operation of a source is appropriate, EPA may stipulate that an expeditious compliance schedule be used as the basis for entry of a judgment order. EPA will seek to ensure that the order embodies certain conditions enumerated in the policy, including,

most importantly, a schedule which is as expeditious as practicable, an interim emission limitation, and significant civil penalties. EPA will evaluate State enforcement actions using the same criteria and will initiate independent Federal action if the State action does not implement the basic goals of the policy.

The policy does not apply to sources of pollutants for which an area has an extended attainment deadline of December 31, 1987, pursuant to Section 172 of the Clean Air Act.

C. STEEL INDUSTRY COMPLIANCE EXTENSION ACT

One of the major emphases of the air enforcement program has been the implementation of the Steel Industry Compliance Extension Act. Under this Act, Congress gave the EPA Administrator authority to extend deadlines for installation of certain air pollution control equipment for up to three years if a company agreed to invest an amount at least equal to the deferred costs of pollution control equipment in modernization to improve the efficiency and productivity of its steel making facilities. Any company that gets an extension must ensure that all of its air pollution sources will comply with applicable standards. The terms of an extension, offsetting modernization requirement, and compliance schedule are to be set forth in consent decrees.

A total of ten companies submitted applications since the legislation was signed on July 17, 1981. Consent decrees implementing the Administrator's favorable findings on four of these applications have been negotiated with the eligible companies and are at various stages in the judicial process. In 1982, consent decrees involving the Ford Motor Company and the Alabama By-Products Corporation were entered by the appropriate U.S. District Courts reflecting extensions and modernization projects. In 1982, the Administrator also completed negotiations approving extensions for the United States Steel Corporation and Sharon Steel Corporation, with formal decrees being entered early in 1983. The Administrator also approved the application submitted by Shenango Incorporated, but the Corporation subsequently withdrew its application because it decided not to invest in modernization.

The applications submitted by the National Steel Corporation, Kaiser Steel Corporation, and Inland Steel Corporation were withdrawn after preliminary indications from the Agency that the corporations were not eligible for extensions under the provisions of the Act. An amended consent decree covering National Steel Corporation's Great Lakes Steel Division was entered in August 1982 requiring compliance by December 31, 1982, and assessing $3.0 million in civil monetary penalties for violations of the original decree. EPA is pursuing enforcement to resolve consent decree violations by the companies.

The application submitted by the Wheeling-Pittsburgh Steel Corporation remains pending with the Agency. Agency staff completed its review of the application in 1982, and recommended that the application be granted if the Corporation first satisfies certain conditions required by the Act. While the Corporation is pursuing satisfaction of these conditions, the negotiations with the Corporation are proceeding to develop a consent decree which would implement favorable findings if they are issued.

D. MAJOR COURT ACTIONS

United States Steel Corporation - On January 6, 1983, the Administrator consented to the entry of seven new or amended consent decrees under the Steel Industry Compliance Extension Act pertaining to the United States Steel Corporation. The decrees establish control programs and compliance schedules for every significant steel making source owned by the Corporation which is not in compliance with the Clean Air Act, and contain stipulated penalty provisions to ensure that the requirements of the decrees are met. The seven decrees cover the Corporation's plants located in Mon Valley and Fairless, Pennsylvania; Lorain, Ohio; Fairfield, Alabama; Gary, Indiana; South Chicago, Indiana; and Baytown, Texas. In accordance with the Extension Act, the Corporation is required to undertake modernization projects totalling $13.68 million in exchange for extensions, up to December 31, 1985, to install certain pollution control equipment. The extensions were found to be necessary to enable the Corporation to invest in these modernization projects. In addition, the decrees require the payment of $250,000 as a penalty for past violations, and contains a commitment by the Corporation to make publically available certain new, very cost-effective, pollution control technology.

Jones and Laughlin Steel Corporation - On December 29, 1982, the Administrator denied the application submitted by the Jones and Laughlin Steel Corporation under the Steel Industry Compliance Extension Act. The denial was based upon a finding that the Corporation is in violation of Federal judicial decrees, and that the violations are not de minimis in nature. The Corporation therefore failed to meet an eligibility requirement established by the Act. The Federal government filed three contempt actions against the Corporation on January 6-7, 1983, citing judicial decree violations at its plants located in Pittsburgh and Aliquippa, Pennsylvania; Cleveland and Campbell, Ohio; and East Chicago, Indiana. The actions seek Clean Air Act compliance at the Corporation's plants and penalties for past decree violations.

National Steel Corporation - As noted earlier, on August 16, 1982, an amended judicial decree was entered affecting the National Steel Corporation's Great Lakes, Michigan facility. The decree required the payment of $3.0 million as a penalty for violations of the original consent decree and expeditious compliance with the Clean Air Act.

Commonwealth Edison, Illinois - EPA concurred on June 30, 1982, in the filing of factual stipulations to be used as the basis of a judgment order resolving this action. The case was originally filed in the Northern District of Illinois by the State of Illinois, and the United States intervened in the action in April 1980. The case involves violations of particulate and sulfur dioxide limitations at 17 units at 7 power plants in Illinois. The stipulation was filed with the court on July 1, 1982, and the court entered the order July 2, 1982. The order provides for compliance at all of the units for both pollutants.

American Brick, Dolton, Illinois - On June 23, 1982, the Northern District of Illinois denied American Brick Company's request that its 1980 consent decree schedule be extended until December 1, 1982. EPA opposed the request on the grounds that the extension was not necessary.

EPA and American Brick Company have now renegotiated the terms of the consent decree which had been entered in August 1980. The modified consent decree was entered January 25, 1983.

Under the terms of the new decree, American Brick is now shut down. On or before April 22, 1983, American Brick will notify EPA whether it elects to remain shut down or to install pollution controls. If it elects to install controls, the company will proceed on a compliance schedule which requires it to complete installation of controls and demonstrate compliance with all applicable Illinois State Implementation Plan limitations no later than October 22, 1984. American Brick will not operate its plant at all between December 31, 1982, and the date on which it begins compliance testing in 1984.

E. COMPLIANCE BY FEDERAL FACILITIES

During 1982, Federal facilities classified as major sources of air pollutants made continuous progress toward coming into compliance with applicable regulations. Through 1982, 336 (92 percent) of these facilities met applicable emissions limitations. Of the 29 noncomplying facilities, 17 have agreed to compliance schedules that will eventually bring them into compliance.

F. LIST OF VIOLATING FACILITIES

The list of violating facilities, under Section 306 of the Clean Air Act, is designed to prevent the Federal government from subsidizing Clean Air Act violators with contract, grant, or loan monies.

No Clean Air Act violators were listed in 1982.

VIII. CONTROL OF MOBILE SOURCE EMISSIONS

Control of motor vehicle emissions has been a Federal responsibility since 1968. The requirements of the Clean Air Act relating to mobile sources have been subsequently refined several times, most recently in 1977. The Clean Air Act Amendments of 1977 established an ambitious regulatory program which addressed problems identified in the motor vehicle emissions control program at that time, and bolstered efforts to attain and maintain the national ambient air quality standards for carbon monoxide (CO) and ozone. The mobile source-related provisions of the 1977 Act include:

- Establishment of a schedule for implementation of stringent emissions standards for automobiles--0.41 grams per mile (gpm) for hydrocarbons (HC), 3.4 gpm for CO, and 1.0 gpm for oxides of nitrogen (NO_x). The table below displays the level of control envisioned by the standards.

New Light-Duty Vehicle Emissions

	Prior to Control	Current Standard	Percent Reduction
Hydrocarbons	8.8 gpm	.41 gpm	95%
Carbon Monixode	87.0 gpm	3.4 gpm	96%
Oxides of Nitrogen	3.6 gpm	1.0 gpm	72%

- Establishment of HC, CO, and NO_x standards for heavy-duty engines similar in stringency to those for light-duty vehicles.

- Additional control of evaporative HC emissions from heavy-duty vehicles through the adoption of a more realistic test procedure.

- Control of particulate emissions from both light-duty and heavy-duty vehicles.

- Implementation of motor vehicle inspection and maintenance (I/M) programs in areas with severe CO and ozone air pollution problems.

In the period since 1977, EPA has made great progress toward fulfilling the Act's mandates. This process has become more complex, however, as a result of the financial difficulties encountered by the automotive industry in recent years. In the Auto Task Force report released by the White House in April 1981, EPA committed itself to a series of regulatory relief measures consistent both with the law and with continued movement toward cleaner air.1/ During 1982, EPA attempted to achieve these goals as it proceeded with development of its mobile source emissions control regulatory program.

A. STANDARD SETTING

Light-Duty Vehicles

Beginning with the 1981 model year, the Clean Air Act standards for automotive exhaust emissions stabilized at 0.41 gpm HC, 3.4 gpm CO, and 1.0 gpm NO_x. (Limited waivers were made available for CO and NO_x.) Achievement of these standards was made possible by the development of sophisticated technology (most notably the three-way catalyst) capable of controlling emissions of HC, CO, and NO_x simultaneously. Starting with the 1983 model year, all gasoline-powered vehicles must meet the statutory standards.

Actions undertaken during 1982 with respect to light-duty vehicle and truck emissions standards include:

- The current standard for particulate emissions from light-duty diesel vehicles is 0.6 gpm. This standard is scheduled to be tightened to 0.2 gpm beginning with the 1985 model year. However, since the technology which was originally planned to be generally available by 1985 has not yet demonstrated sufficient reliability, EPA proposed to postpone the more stringent standards until 1987.2/ In the interim, EPA has undertaken an in-depth study of controlling diesel particulates in order to develop standards that will achieve the greatest impact on air quality while causing the least disruption to the industry.

- EPA has developed a plan to regulate light-duty diesel particulate emissions through averaging (i.e., control of emissions from a manufacturer's fleet on the average rather than from each individual vehicle). This concept affords manufacturers the option of selecting the most cost-effective way of controlling emissions from their fleets by optimizing controls on selected vehicles rather than on all vehicles in the fleet. Final rulemaking is expected during 1983.

- The Clean Air Act requires that as of 1984, all cars sold in the U.S. must be capable of meeting the emissions standards regardless of altitude. EPA has proceeded with the development of regulations designed to meet the Act's requirements. Separate rulemakings for model year 1984 light-duty trucks and passenger cars were prepared for promulgation in early 1983, in conjunction with the release to the Congress of a formal report on this issue. In addition, EPA has set interim high altitude standards applicable to model years 1982 and 1983 for both cars and light trucks. A regulation proposed in late 1982 is designed to assure that the impact of these interim standards focuses on those counties with the most severe pollution problems.3/

Heavy-Duty Engines

With the achievement of strict standards by passenger cars, EPA has devoted additional attention to the development of a parallel set of standards for heavy-duty engines. This process is especially important in light of projections that heavy-duty vehicles will be an increasingly significant contributor to emissions inventories for the rest of the century.

During 1982, EPA made progress on a number of issues related to heavy-duty engines:

- A regulation limiting evaporative HC emissions from heavy-duty trucks was prepared for promulgation in early 1983. These standards will reduce the levels of nomethane hydrocarbons (NMHC) by 92 percent over uncontrolled levels.

- Exhaust emission regulations that were to take effect in the 1984 model year specified that light trucks and heavy-duty engines must meet new HC and CO standards that would require the use of catalyst technology. In January 1982, EPA proposed to revise the CO standard to a level that would not require catalysts, resulting in substantial cost-savings while still achieving significant emission reductions over current standards.4/ This revision was not projected to affect the ambient attainment status for CO or ozone. A number of factors combined to warrant this modification to the CO standard. After the promulgation of the model year 1984 catalyst standards in 1979, the industry began to experience the effects of the economic downturn. As a result of these economic difficulties, a series of actions to provide some relief to the industry was undertaken in April 1981. Among these actions was the proposal by EPA to adjust the standards for HC and CO. Because of the inherent complexities, however, it has not been possible to resolve all the issues and to promulgate the final rule. EPA will continue to work with the industry to clarify the issues and develop workable solutions.

- A related rulemaking delaying the implementation of the new HC/CO standards until model year 1985 was prepared for promulgation in early 1983. This delay will ease manufacturers' concerns about adequate leadtime and give EPA the opportunity to resolve pending issues related to the standards.

- EPA improved its testing data base and performed technical analyses in preparation for the 1984 promulgation of standard for heavy-duty NO_x and particulate emissions. This set of regulations was the focus of a public hearing held in July 1982.

Other Vehicle Categories

During 1982, EPA promulgated a revised set of standards for emissions of HC and CO from aircraft; this rule substituted for outdated standards that were set to take effect on January 1, 1983, and were more consistent with international standards.5/ A related rule concerning aircraft smoke emissions was prepared for promulgation in early 1983.

Fuels

In October 1982, EPA published a rule revising the standards applicable to lead in gasoline.6/ This rulemaking, which will reduce airborne lead 34 percent more by 1990 than under the rule previously in effect, resulted from a review initiated in 1981 at the request of the Presidential Task Force on Regulatory Relief. It will speed up reductions in airborne lead levels to protect the health and welfare of all Americans, particularly pre-school children in urban areas.

EPA has also been concerned about the regulatory implications of the potential introduction into the marketplace of alternative fuels such as methanol. A report on this subject was prepared for delivery to Congress in early 1983 and several fuel waivers were processed.

B. PREPRODUCTION COMPLIANCE

One of EPA's long-standing techniques for assuring compliance with motor vehicle emissions standards is the preproduction certification review program. Initiated in 1968, the program entails engineering review by EPA staff of engine families representing the new vehicles to be sold in the United States. Steps in the process include submission by manufacturers of technical data about respective vehicles, emissions testing of prototypes by manufacturers, review of engineering data and test results by EPA, and, in certain cases, confirmatory testing of prototypes at EPA's laboratory facility in Ann Arbor, Michigan.

During 1982, EPA completed a series of major changes to the preproduction certification program. Now that many emissions standards are at or close to their statutory levels, and manufacturers are familiar with the testing program, extensive EPA involvement in the day-to-day process is no longer required. After a thorough review of all procedures, EPA developed reforms which have reduced the complexity and cost of the program, and focused most effort on those engine families with the greatest potential impact on air quality. The new certification rules simplify testing requirements, reduce paperwork by approximately 20 percent, and increase industry flexibility. The resulting savings to manufacturers will be at least $5 million annually.

C. INSPECTION/MAINTENANCE

A strategy for dealing directly with in-use emissions problems is the encouragement of motor vehicle inspection and maintenance (I/M) programs. EPA's basic approach in this area was determined by the 1977 Amendments to the Clean Air Act. Urban areas of the country which obtained an extension in the deadline for attaining the ambient air quality standards for automotive-related pollutants beyond 1982 are required by the Act to implement an I/M program.

This I/M requirement applies to areas in 30 States. As of the end of 1982, 14 States already had operating programs, two others were on schedule, and 14 others were deficient. States whose State Implementation Plans are disapproved due to the failure to proceed with an I/M program will be subject to the sanctions specified in the Act.

D. ALTERNATIVE COMPLIANCE MEASURES

In recent years, increasing attention has focused on the problem of excessive emissions from in-use vehicles. This emphasis has resulted from the perception that the Nation's considerable investment in vehicle emissions control technology can be squandered if for any reason the equipment does not perform as anticipated in actual use.

EPA is now proceeding with a study whose goal is to identify the most efficient way to achieve in-use venicle compliance with emissions standards. It is possible that an alternative approach could entail an expanded role for emissions averaging. An ongoing in-use vehicle testing effort is aimed at generating data for this study. EPA anticipates that the analytical work may be completed sometime during 1985. If a replacement program is feasible, appropriate legislation will be proposed to the Congress and an appropriate program developed.

E. MOBILE SOURCE ENFORCEMENT

The EPA mobile source enforcement program is directed primarily toward achieving compliance with motor vehicle emissions standards and fuel regulations as required by the Clean Air Act. The major goals and objectives are to: (1) assure that new vehicles meet emissions standards; (2) assure that vehicles meet emissions standards in use; (3) assure that emissions control systems are not removed or rendered inoperative; (4) assure control of hydrocarbon emissions during gasoline transfer operations; (5) assure that harmful additives are not present in gasoline; (6) administer statutory and California emissions standards waivers; and (7) administer the statutory emissions warranties.

Recall Program

Section 207(c) of the Clean Air Act authorizes EPA to order the recall of vehicles if a substantial number of any class of vehicles do not conform to emissions standards. During 1982, 1,169,352 vehicles were recalled either by direct order of EPA or as a result of an EPA investigation. In the same period, manufacturers voluntarily recalled 28,049 vehicles to correct emissions problems. EPA conducted a total of 42 recall investigations in fiscal year 1982, and performed 612 tests of in-use vehicles at laboratory facilites in Springfield, Virginia, and Ann Arbor, Michigan. In order to assure that emissions control systems operate properly throughout their useful lives, EPA has focused increasingly on testing and investigation of high mileage vehicles.

Emissions Standards Waivers

During 1982, EPA granted several requests from automobile manufacturers for a short-term waiver of the 1981-1982 model year carbon monoxide (CO) emissions standard for gasoline engine powered automobiles and 1981-1984 model year oxides of nitrogen (NO_x) emissions standard for diesel engine powered automobiles.

Selective Enforcement Auditing

In order to assure that production vehicles are made in accordance with emissions standards, EPA conducts Selective Enforcement Audit (SEA) test programs at manufacturers' facilities. EPA has found that the SEA program encounters few failures, because automobile manufacturers routinely test on a voluntary basis many more vehicles than are strictly required through SEA orders. Therefore, beginning in 1981, EPA changed its SEA policy to place greater reliance on manufacturer testing programs and less on EPA-mandated audits. In fiscal year 1982, EPA conducted 25 SEA test programs.

Unleaded Gasoline Enforcement Program

EPA has responsibility for enforcing Section 211 of the Clean Air Act, relating to the regulation of fuels and fuel additives. One of the regulations under this section of the Act is aimed at protecting the catalytic converters on 1975 and later model year cars.

EPA has established a nationwide fuels enforcement program to ensure that affected retail outlets comply with these regulations. This program includes sampling of the fuel at retail outlets by Regional EPA field inspectors and private or State inspectors under EPA contract, in order to measure the fuel's lead content. EPA conducted 14,000 inspections under this program during 1982.

Tampering/Fuel Switching

EPA is also responsible for carrying out programs designed to deter tampering with vehicle emissions control systems or using leaded fuel in vehicles which require unleaded fuel. Surveys undertaken by EPA have shown tampering and fuel switching to be continuing serious problems which undermine the emissions control performance of many in-use vehicles. The latest survey indicates that about 17 percent of the vehicle fleet is subject to gross tampering, and about 12 percent to fuel switching.

In 1982, EPA prepared an initiative to promote State and local anti-tampering and anti-fuel switching enforcement programs. The aim of this initiative is to establish tampering and fuels programs which directly benefit HC, CO, and NO_x nonattainment areas. Implementation of the initiative will proceed in 1983.

In a related area, EPA is in the process of revising its current anti-tampering regulations in order to clarify precisely what constitutes tampering and what is the liability of manufacturers, suppliers, and repairers of motor vehicles. As part of this process, EPA sponsored a public workshop on anti-tampering issues in July 1982.

Enforcement Regulations Development

The Clean Air Act prohibits the introduction into commerical use of automobiles which are not certified as meeting emissions standards, but the Act and EPA regulations permit manufacturers to apply for exemptions for vehicles used in development and testing programs for new engines or other technologies. In July 1982, EPA revised its regulations governing these exemptions in order to simplify the application process and reduce reporting requirements.

Another regulatory amendment signed by the Administrator in 1982 makes the octane designation portion of EPA's unleaded gasoline regulations consistent with the Petroleum Marketing Practices Act.7/ Gasoline distributors and dealers will therefore not be forced to obtain separate octane values in order to comply with EPA and FTC rules.

IX. LITIGATION

The United States Courts of Appeals decided ten cases under the Clean Air Act in 1982. The range of issues covered was unusually narrow, for all but one of the cases involved the rules for setting up, approving, and operating State Implementation Plans (SIP's). These plans are the basic regulatory structures through which States work to attain the national air quality standards and to implement the prevention of significant deterioration (PSD) program.

The most significant case of the year was NRDC v. Gorsuch, 685 F.2d 718 (D.C. Cir.). Under the Clean Air Act, every major new source of air pollution and every modification to an existing major source that is located in an area which is not attaining national ambient air quality standards must meet certain regulatory conditions and obtain a permit before construction begins. A source is modified within the meaning of this requirement if its emissions of a pollutant for which its area is nonattainment increase by significant amounts.

The question posed in the NRDC case arises when a number of emitting units, each of which would be a major source when viewed in isolation, are located at a common plant site. EPA, by regulation, had moved to allow States to define the entire plant as the source for purposes of new source review. Under this definition, increases at units at such a plant would be excluded from new source review even when they exceeded the significance threshold as long as the source owner produced simultaneous emissions decreases elsewhere in the plant so that emisisons from the plant as a whole did not increase above this threshold.

The D.C. Circuit rejected this approach and held that its prior decisions had drawn a "bright line" between programs designed to improve air quality, as to which such a "bubble" approach to new source review was forbidden, and programs designed to maintain existing levels of air quality, as to which the "bubble" approach was permitted.

1982 also saw decisions in the first of many pending challenges to EPA approval of State relaxations of control requirements for sulfur dioxide (SO_2). In three decisions issued the same day, the Second Circuit upheld EPA's approval of such revisions.

In Connecticut Fund for the Environment v. EPA, 696 F.2d 169, the court held that EPA was not required to consider the possible impact on particulate concentrations of relaxing emission limits in Connecticut for SO_2, in part because the Clean Air Act does not appear to contemplate such a requirement and in part because evaluating the transformation of SO_2 into particulates, particularly over long distances, presents technical and scientific problems that the Agency has not yet successfully resolved.

In a companion case of the same name [696 F.2d 179], the court upheld a Connecticut program that allowed sources that carried out energy conservation programs to burn higher sulfur fuel in return. The court relied in part on the same reasoning as in its first case and in part on the fact that each new individual SO_2 limit would be the subject of public notice and comment as a SIP revision.

The third case, State of Connecticut v. EPA, 696 F.2d 147, involved a challenge by Connecticut to an emission limit set by New York and approved by EPA that allowed a power plant on Long Island to continue burning higher sulfur fuel than New York generally allows. The court approved EPA's technical decisions in deciding that the plant in question did not have a significant effect on air quality in Connecticut. It also addressed the meaning of the provisions of the Clean Air Act that seek to prevent one State from polluting the air of another, upholding EPA's view that these provisions bar emissions increases in one State that, under existing control patterns, would cause violations of the standards in another, but not those that would have a lesser adverse impact. It did, however, suggest that the Clean Air Act requires EPA to evaluate the effect of a change in SO_2 emission limits in one State on particulate concentrations in another, even though such an analysis is not required within the State that is changing its SO_2 requirements. Nevertheless, the court upheld EPA's decision because it found that the direct impact of the plant's SO_2 emissions would be minimal and that EPA lacked the technical capability to evaluate the impact of any atmospheric transformation of SO_2 into particulates. Finally, the court left open the question of how the effects of interstate pollution on the PSD program should be evaluated.

In yet another case entitled Connecticut Fund for the Environment v. EPA, 672 F.2d 998 (2d Cir. 1982), the Second Circuit upheld EPA's policy of "conditionally approving" State submissions that were not fully complete conditioned on the States repairing the deficiencies within a set time. However, it also concluded that EPA could not lift the restrictions on construction of new or modified major stationary sources of air pollution that the statute imposes on States without approved SIP's until the SIP had been fully--rather than conditionally--approved.

In Council of Commuter Organizations v. Gorsuch, 683 F.2d 648 (2d Cir. 1982), the court applied this same reasoning to EPA's approval of a plan to control auto-related pollutants in New York City. It also found that this plan satisfied the first round of requirements of the Clean Air Act relating to public transit systems (including a provision that only applied to New York City).

In Public Service Company of Indiana v. EPA, 682 F.2d 626 (7th Cir. 1982), the court rejected industry arguments that in passing on State-submitted SIP revisions, EPA must either approve them as a whole or disapprove them as a whole. Instead, it upheld EPA's authority to approve those portions of a submission that met the standards of the Clean Air Act and disapprove those that did not.

In a final case relating to the adequacy of State SIP submissions, the Ninth Circuit held that the Pacific Legal Foundation lacked standing to challenge EPA's imposition of construction limitations on California, and its barring of certain Federal grants there, because of California's failure to conform its implementation plan provisions to the requirements of Part D of the Clean Air Act. Pacific Legal Foundation v. Gorsuch.

In Roosevelt Campobello International Park Commission v. EPA, 684 F.2d. 1034 (1st Cir. 1982), the court held that judicial review of various questions relating to EPA's grant of a PSD permit to the Pittston Company's proposed refinery at Eastport, Maine, was not appropriate because the permit would not be of any practical use unless EPA also amended some of the applicable regulations, a step which it had not yet taken.

In Kennecott Corp. v. EPA, 684 F.2d 1007, the D.C. Circuit invalidated the portion of EPA's Section 119 nonferrous smelter order (NSO) regulations governing how the Agency determines a smelter's eligibility for an NSO. EPA's test would have allowed an NSO, which postpones SIP compliance, only when timely SIP compliance would cause the smelter to shut down. The court found this too stringent, holding that Congress did not intend to deny an NSO when timely compliance would impose on the smelter certain adverse economic consequences short of shutdown. The decision pertains only to EPA's NSO rules for the first statutory period, which expired at the end of 1982. However, its reasoning will be relevant to EPA's forthcoming NSO rules for the second period, 1983-1988.

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